ORIGINAL RESEARCH

A CROSS-SECTIONAL STUDY TO EVALUATE ORAL HYGIENE AS A RISK FACTOR FOR INFECTIVE ENDOCARDITIS–RELATED BACTEREMIA

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ABSTRACT
Background: The present study was undertaken for evaluating the oral hygiene as a risk factor for infective endocarditis–related bacteremia.
Materials & methods: A total of 60 patients were enrolled. A total of three study groups were formed as follows: Tooth brushing group, Single tooth extraction with antibiotic prophylaxis group and single tooth extraction with a placebo group. Sixty minutes after administration of the placebo and 15 minutes before surgery, administration of local anaesthetic solution was done in the extraction group with lidocaine. We administered mepivacaine hydrochloride without vasoconstrictor if further local anesthesia was necessary. This was followed by extraction of the indicated tooth. Blood samples were obtained from all the subjects and were sent for bacteriological culture profiling
Results: Mean age of the tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group was 41.5 years, 42.9 years and 39.8 years respectively. Plaque index ≥ 2 was seen in 10, 11 and 10 subjects of tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group respectively. Toothbrushing group had higher incidence of bacteremia in comparison to other two study groups.
Conclusion: It has been demonstrated that techniques employed to prevent infective endocardititis that originate from oral bacteria should focus on improving oral hygiene.
Key words: Oral hygiene, Infective endocarditis, Bacteraemia

INTRODUCTION

Bacterial endocarditis refers to infection of the endocardial surface of the heart. It usually involves heart valves, but it can occur on the endocardium or intracardiac devices. There are two types: Acute endocarditis is a febrile illness that rapidly damages cardiac structures and spreads hematogenously which can progress to death within weeks if not treated. Subacute endocarditis has a slower disease process and may be present for weeks to months with gradual progression unless complicated by major embolic event or ruptured structure.[1-3]

Without early identification and treatment, a myriad of intracardiac and far-reaching extracardiac complications can develop. Therefore, careful evaluation, including a thorough history and physical exam, can help diagnoses cases and guide management, limiting mortality and morbidity.[4] IE antibiotic prophylaxis strategies have been therefore proposed for years to patients with IE predisposing cardiac conditions (PCCs) undergoing invasive procedures responsible for bacteremia.

As the proof of their efficacy is lacking, guidelines have been altered toward a drastic reduction in antibiotic prophylaxis indications.[5, 6] Hence; the present study was undertaken for evaluating the oral hygiene as a risk factor for infective endocarditis–related bacteremia.

MATERIALS & METHODS

The present study was undertaken for evaluating the oral hygiene as a risk factor for infective endocarditis–related bacteremia. A total of 60 patients were enrolled. A total of three study groups were formed as follows: Tooth brushing group, Single tooth extraction with antibiotic prophylaxis group and single tooth extraction with a placebo group. Complete demographic details of all the patients were obtained. Complete medical history of all the subjects was also obtained. Thorough intra-oral examination of all the subjects was done. Assessment of oral hygiene status was done for identifying plaque, calculus and gingival indices. Probing depth was used for measuring the periodontal status. Examination of radiographs was done for evaluation the presence and depth of caries. Al the participants of the tooth brushing group to brush all tooth surfaces adjacent to the gingiva with a new toothbrush and without tooth-paste.

Sixty minutes after administration of the placebo and 15 minutes before surgery, administration of local anaesthetic solution was done in the extraction group with lidocaine. We administered mepivacaine hydrochloride without vasoconstrictor if further local anesthesia was necessary. This was followed by extraction of the indicated tooth. Blood samples were obtained from all the subjects and were sent for bacteriological culture profiling. All the results were recorded and analysed using SPSS software.

RESULTS

Mean age of the tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group was 41.5 years, 42.9 years and 39.8 years respectively. Plaque index $\geq$ 2 was seen in 10, 11 and 10 subjects of tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group respectively. Toothbrushing group had higher incidence of bacteremia in comparison to other two study groups.

Table 1: Demographic variables

Variable	Tooth brushing group	Single tooth extraction-antibiotic prophylaxis group	Single tooth extraction-placebo group
Mean age (years)	41.5	42.9	39.8
Males (n)	12	13	12
Females (n)	8	7	8
Plaque index $\geq$ 2 (n)	10	11	10
Average pocket depth (mm)	3.8	3.7	3.8

Table 2: Correlation between incidence of bacteraemia with infective endocarditis related bacterial species

Variable	P-value		
	Tooth brushing group	Single tooth extraction-antibiotic prophylaxis group	Single tooth extraction-placebo group
BMI	0.12	0.85	0.11
Mean plaque score	0.00*	0.12	0.78
Mean gingival score	0.46	0.36	0.28
Bleeding with tooth brushing	0.00*	0.77	0.81
Apical lucency	0.94	0.19	0.71
Incidence of bacteraemia	0.00*	0.64	0.51

DISCUSSION

Endocarditis is rarely an obvious diagnosis for a generalist. It may present with a wide variety of clinical signs, some subtle; the diagnosis may be difficult or the signs misleading, and there is a wide differential diagnosis to consider. However, there is a wealth of clinical signs to look for. Infective endocarditis is a substantial cause of morbidity and mortality in children and adolescents despite new advantages in management and prophylaxis. Infective endocarditis can include acute and subacute bacterial endocarditis, as well as nonbacterial endocarditis caused by viruses, fungi, and other microbiologic agents. Since the infecting organism has changed over time, diagnosis sometimes can be difficult during the early stages of the disease and is often delayed until a serious infection is already in place.[7, 8] Over 700 bacterial species have been identified in the human oral cavity. Some of these species cause local infections, such as periodontal disease (PD). Far more species, however, have been identified in bacteremia; after they enter the circulation, some have the potential to cause distant-site infections (DSI), such as infective endocarditis (IE) or prosthetic joint infections (PJIs). Bacteremia is common following invasive dental procedures as well as routine dental manipulations, such as tooth brushing. As a result, there has been a longstanding focus on preventing or reducing bacteremia with the use of antibiotic prophylaxis (AP) before dental procedures in patients at risk for DSIs.[8- 10] Hence; the present study was undertaken for evaluating the oral hygiene as a risk factor for infective endocarditis–related bacteraemia.

In the present study, mean age of the tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group was 41.5 years, 42.9 years and 39.8 years respectively. Plaque index ≥ 2 was seen in 10, 11 and 10 subjects of tooth brushing group, Single tooth extraction-antibiotic prophylaxis group and Single tooth extraction-placebo group respectively. Our results were in concordance with the results obtained by previous authors who also reported similar findings. In a study conducted by Lockhart PB et al, authors determined if poor oral hygiene or dental disease are risk factors for developing bacteremia after toothbrushing or single-tooth extraction. One hundred ninety-four participants in a study were in either a toothbrushing group or a single-tooth extraction with placebo group. The authors found that oral hygiene and gingival disease indexes were associated significantly with IE-related bacteremia after toothbrushing. Participants with mean plaque and calculus scores of 2 or greater were at a 3.78- and 4.43-fold increased risk of developing bacteremia, respectively. The presence of generalized bleeding after toothbrushing was associated with an almost eightfold increase in risk of developing bacteremia. There was no significant association between any of the measures of periodontal disease and the incidence of bacteremia after toothbrushing. The oral hygiene or disease status of a tooth was not significantly associated with bacteremia after its extraction. They concluded that Bacteremia after toothbrushing is associated with poor oral hygiene and gingival bleeding after toothbrushing.[11]

In the present study, toothbrushing group had higher incidence of bacteremia in comparison to other two study groups. Duval X et al, in another study, conducted an assessor-blinded case-control study in 6 French tertiary-care hospitals. Cases (n = 73) were more likely than controls (n = 192) to be aged <65 years (odds ratio [OR], 2.85; 95% CI, 1.41–5.76), to be female (OR, 2.62; 95% CI, 1.20–5.74), to have native valve disease (OR, 2.44; 95% CI, 1.16–5.13), to use toothpicks, dental water jet, interdental brush, and/or dental floss (OR, 3.48; 95% CI, 1.30–9.32), and to have had dental procedures during the prior 3 months (OR, 3.31; 95% CI, 1.18–9.29), whereas they were less likely to brush teeth after meals. The presence of gingival inflammation, calculus, and infectious dental diseases did not significantly differ between groups. Patients with IE caused by oral streptococci differ from patients with IE caused by nonoral pathogens regarding background characteristics, oral hygiene habits, and recent dental procedures, but not current orodental status.[12]

CONCLUSION

It has been demonstrated that techniques employed to prevent infective endocardititis that originate from oral bacteria should focus on improving oral hygiene.

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